

1.0 INTRODUCTION

It is the policy of Texas A&M University-Kingsville to provide employees with a safe and healthful working environment. The University uses engineering, administrative, and procedural controls to protect people from dangerous atmospheres, including harmful mists, smoke, vapors, particulates and oxygen-deficient atmospheres. When these controls cannot provide adequate protection against harmful atmospheres, respiratory protection is necessary.

The basic purpose of any respirator is to protect the respiratory system from inhalation of hazardous atmospheres. Respirators provide protection either by removing contaminants from the air before it is inhaled or by supplying an independent source of breathing air.

Contractors are responsible for providing their own respiratory protection programs and respiratory protective equipment.

2.0 RESPONSIBILITIES

2.1 Environmental Health and Safety Office

The Environmental Health & Safety (EHS) Office is responsible for establishing and maintaining a respiratory protection program consistent with the goal of protecting TAMUK personnel. The EHS Office will implement a Respiratory Protection Program which is designed and organized to ensure respirators are properly selected, used, and maintained by university personnel, and meets federal regulatory requirements as identified in 29 CFR 1910.134.

The EHS Office is also responsible for:

- assisting university departments in evaluating those tasks for which respiratory protection is thought to be necessary;
- determining the degree of hazard posed by the potential exposure;
- determine whether engineering or administrative controls are feasible;
- specify which respiratory protection device is to be used at each task;
- and train personnel in the selection and use of respiratory protective devices and conduct qualitative fit testing.

2.2 Supervisor

Supervisors will ensure each employee under his or her supervision using a respirator has received appropriate training in its use. Supervisors will ensure annual medical evaluations are scheduled, provide appropriate respirators and accessories, and ensure that proper respirator maintenance and storage is being conducted.

Supervisors must identify the tasks which could require the use of respiratory protection, and communicate these tasks with the EHS Office. Supervisors shall ensure that all employees engaged in such work use appropriate respirators.

2.3 Respirator Wearers

It is the responsibility of each employee to wear his/her respirator when and where required and in the manner in which they were trained. Respirator wearers must report any malfunctions of the respirator to his/her supervisor immediately. The respirator wearer must also guard against mechanical damage to the respirator, clean the respirator as instructed, and store the respirator in a clean, sanitary location.

2.4 Contractors

Contractors are required to develop and implement a respiratory protection program for their employees who must enter into or work in areas where exposure to hazardous materials can not be controlled or avoided. This program must meet OSHA regulations and include issuance of respirators, medical evaluations, fit testing and training.

3.0 MEDICAL EVALUATION

Employees who may be required to wear respiratory protection in atmospheres where hazardous contaminants exceed the Permissible Exposure Limit (PEL) as set by OSHA must undergo an initial medical evaluation and annually thereafter. During the medical evaluation the Occupational Physician makes a determination as to whether or not an employee can wear the required respirator without physical or psychological risk. Based on the overall health of the individual and special medical tests (pulmonary function studies, EKG, etc.) as appropriate, the examining physician determines whether or not the individual will be restricted from wearing respiratory protective equipment.

Specific medical tests and procedures will be determined by the Occupational Health Physician and will be in accordance with OSHA medical surveillance requirements and/or NIOSH recommendations.

4.0 USAGE, TYPE AND SELECTION OF RESPIRATORY PROTECTION DEVICES

4.1 Respirator Use

Respiratory protection is authorized and issued for the following personnel:

- Workers in areas known to have contaminant levels exceeding the PEL or in areas which contaminant levels exceeding the PEL may be created without warning (i.e., emergency purposes such as hazardous material spill responses).
- Workers in suspect areas or performing operations suspected of being health hazardous but for which adequate sampling data has not been obtained.

4.2 Use of Respirators When Not Required Under State or Federal Regulations

In accordance to Appendix D of 29CFR 1910.134, Texas A&M University-Kingsville is providing the following information to employees who wear respirators when respirators are not required by state or federal regulations.

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker.

On occasions, employees may be required to wear respirators or dust masks to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If the university provides respirators or dust filters to employees who will not be exposed to hazardous substances in excess of the PEL the following guidelines will be followed to ensure that the respirator itself does not present a hazard. These guidelines must also be followed for those employees that provide his or her own respirator to be worn in areas that do not exceed the PEL.

1. Medical evaluations are not required.
2. The EHS Office will provide approved respirators certified for use to protect against the contaminant of concern.
3. The EHS Office will provide training on respiratory protection at the time respirators are distributed. This training will consist of providing information on use and warnings regarding the respirators limitations, maintenance of the respirator, and cleaning and care of the respirator.
4. The EHS Office will conduct a Qualitative Fit Test to assure a proper fitting respirator.

4.3 Types of Respirators

4.3.1 Air-Purifying Respirators

These respirators remove air contaminants by filtering, absorbing, adsorbing, or by chemically reacting with the contaminants as they pass through the respirator canister or cartridge. The Air-Purifying Respirator is to be used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

1. Particulate Respirators: filter out dusts, fibers, fumes and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters.
2. Gas/vapor Respirators: remove specific individual contaminants or a combination of contaminants by absorption, adsorption or by chemical reaction. Gas masks and chemical-cartridge respirators are examples of gas- and vapor-removing respirators.
3. Combination particulate and gas/vapor Respirators: combine the respirator characteristics of both kinds of air-purifying respirators.

Function and Limitations of Air-Purifying Respirators:

Ambient air, prior to being inhaled, is passed through a filter, cartridge, or canister, which removes contaminants. Different filters are required to remove different contaminants. Contact the EHS Office for assistance in determining the correct filter or cartridge.

1) Non-powered Air-Purifying Respirator

The breathing action of the wearer operates the non-powered type of respirator. The respirator is secured to the face by means of a strap or harness. The wearer pulls air through the cartridge(s) during inhalation.

- Air purifying respirators use ambient air and **cannot** be used in oxygen deficient atmospheres (must be at least 19.5% oxygen); Immediately Dangerous to Life or Health (IDLH) atmospheres; or areas where the identity or concentration of a contaminant is unknown.
- The respirator's cartridge(s) must be specifically selected according to the contaminant. Using the wrong cartridge(s) could cause injury to the user.
- The cartridge(s) must be replaced if the user notices an odor, taste, throat irritation or breathing becomes difficult. Wet, damaged, and grossly contaminated cartridge(s) must also be replaced.

Mask Types:

- ✓ Full-face mask - covers the face from the hairline to below the chin. This type of mask provides eye protection.
- ✓ Half-mask - covers the face from above the nose to below the chin.

2) Powered Air-Purifying Respirator

Powered air-purifying respirators filter the ambient air using a small pump and provides the filtered air to the user in a positive-pressure continuous flow mode. The user wears a small pump with air filters around the waist and a helmet & face shield unit. The air is pumped through the cartridge(s) and delivered to the helmet through a small flexible hose.

- Powered air-purifying respirators must also not be used in an oxygen deficient atmosphere; Immediately Dangerous to Life or Health (IDLH) atmospheres; or areas where the identity or concentration of a contaminant is unknown.
- Powered air-purifying respirator's cartridge(s) must be specifically selected according to the contaminant and the cartridge(s) must be replaced if the user notices an odor, taste, throat irritation or breathing becomes difficult. Wet, damaged, and grossly contaminated cartridge, canister or filter must also be replaced.

3) Disposable or single-use respirators are made of cloth or paper and are primarily used for nuisance dusts.

4.3.2 Supplied-Air Respirators

These respirators provide breathing air independent of the environment. Such respirators are to be used when the contaminant has insufficient odor, taste or irritating warning properties, or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Supplied- air respirators, also called air-line respirators, are classified as follows:

- Demand

This respirator supplies air to the user on demand (inhalation) which creates a negative pressure within the face-piece. Leakage into the face-piece may occur if there is a poor seal between the respirator and the user's face.

- Pressure-Demand

This respirator maintains a continuous positive pressure within the face-piece, thus preventing leakage into the face-piece.

- Continuous Flow

This respirator maintains a continuous flow of air through the face-piece and prevents leakage into the face-piece.

4.3.3 Self-Contained Breathing Apparatus (SCBA)

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection but is also the most complex. Training and practice in its use and maintenance is essential. SCBAs will only be used at the university in emergency situations.

The following table is a brief overview of limitations of the various types of respiratory protection devices available to university employees.

RESPIRATOR TYPE	PROTECTION FROM	NO PROTECTION FROM
Dust Mask	<ul style="list-style-type: none"> • Dust • Grass and weeds 	<ul style="list-style-type: none"> • Chemical vapors or gases and; • Oxygen deficiency
Respirator with HEPA cartridge	<ul style="list-style-type: none"> • Dust • Fumes • Smoke • Mist • Microorganisms • Asbestos 	<ul style="list-style-type: none"> • Chemical vapors or gases and; • Oxygen deficiency
Chemical cartridge or canister respirator	<ul style="list-style-type: none"> • Specific gases up to a particular concentration 	<ul style="list-style-type: none"> • Oxygen deficiency • Particulate matter
Air supplied respirator/SCBA	<ul style="list-style-type: none"> • Particulates • Chemical Vapors / gases • Oxygen Deficiency 	

4.3 Respirator Selection

Selection of the proper respirator(s) to be used in any work area or operation at Texas A&M University-Kingsville is made only after a determination has been made as to the real and/or potential exposure of employees to harmful concentrations of contaminants in the workplace atmosphere. This evaluation will be performed prior to the start of any routine or non-routine tasks requiring respirators. Respiratory protective devices will be selected by the Office of Health and Safety, using ANSI Z88.2, NIOSH Certified Equipment List, and/or the NIOSH Respirator Selection Decision Logic as a guide.

The following items will be considered in the selection of respirators:

- Identity and concentration of contaminant;
- Hazards of contaminant;
- General environment (open shop or confined space, etc.);
- Known limitations of the respiratory protective device;
- Comfort, fit, and worker acceptance; and
- Other contaminants in the environment or potential for oxygen deficiency.

Follow these guidelines for selecting the correct respirator:

- **Use a Dust Mask:**
For procedures that produce only nuisance dust and not toxic particles.
Examples: Sanding wood, sweeping sawdust, mowing grass, etc.
- **Use a Respirator with HEPA Filters:**
 - ✓ If the contaminate contains toxic particles or is a biological hazard.
 - ✓ Examples: Scraping lead based paint; welding fumes; asbestos cleanup; handling animal carcasses.
 - ✓ HEPA Filters are only intended to provide protection against particles and fibers and not chemical vapors.
- **Use a Respirator with Chemical Filters:**
 - ✓ For operations dealing with organic or inorganic chemicals.
 - ✓ Examples: Painting operations; pesticide applications; operations involving acids.
 - ✓ Wear a respirator with chemical filters only when you know what chemical is present and its concentration.
 - ✓ Wear a respirator with chemical filters only when there is adequate oxygen-19.5%.
- **Use a Supplied Air Respirator (Air Line):**
 - ✓ If the identity and/or concentration of the contaminant is not known.
 - ✓ If an oxygen deficient atmosphere is known or suspected.
 - ✓ If an IDLH condition exists.

- ✓ It is unlikely that any work with Supplied Air Respirators will be required by university employees.
- **Use a SCBA instead of an airline respirator:**
 - ✓ SCBAs will only be utilized in emergency situations.

4.4 Identification of Respirator Cartridges

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants, and are specifically labeled and color coded to indicate the type and nature of protection they provide. Respirator cartridges and respirators are manufacturer specific which means that a respirator cartridge from one manufacturer can not be used with another manufacturer's respirator.

It is a common industry practice to color code respirator cartridges as to the type of contaminant the cartridge protects against. Most manufactures follow the similar color code, however, prior to wearing a respirator always ensure that the correct cartridge has been selected and do not identify the cartridge simply by its color.

The following chart identifies the most common types of cartridges along with their identifying color:

Cartridge Color	Description	Approved for Type of Contaminants
Olive Green	Multi-Contaminant Cartridge	Organic vapors, chlorine, hydrogen chloride, chlorine dioxide, sulfur dioxide, ammonia, methylamine, formaldehyde, hydrogen fluoride, hydrogen sulfide (escape only)
Black	Organic Vapor Cartridge	Organic vapors (i.e., paint, paint thinner, acetone, hexane, etc.)
Yellow	Organic Vapors/ Acid Gas Cartridge	Organic vapors, chlorine, hydrogen chloride, sulfur dioxide, hydrogen fluoride, hydrogen sulfide (escape only)
White	Acid Gas Cartridge	Chlorine, hydrogen chloride, sulfur dioxide, formaldehyde
Green	Ammonia/Methylamine Cartridge	Ammonia, methylamine
Magenta (hot pink)	P100 (HEPA) Cartridge	At least 99.97% efficient against all types of particulate aerosols (i.e., lead dust, asbestos, etc). NOTE: Will not protect against vapors

4.5 Warning Signs of Respirator Failure

All respirator cartridges have a range of effective use or a “life span”. When the cartridge has been exposed to large amount of contamination or moisture the cartridge becomes breached and is no longer effective. The following are methods in which the respirator user can determine if his or her respirator cartridge has become ineffective.

- Particulate Air-Purifying

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), the filter(s) must be replaced. Disposable filter respirators must be discarded.

- Gas or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (i.e., odor, taste, eye irritation, or respiratory irritation) occur, promptly leave the area and check the following:

- ✓ Proper face seal
- ✓ Damaged or missing respirator parts
- ✓ Saturated or inappropriate cartridge or canister

If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the concentration of the contaminants may have exceeded the cartridge or canister design specification. When this occurs an airline respirator or SCBA is required.

5.0 RESPIRATOR TRAINING

University employees who may be required to wear a respirator will receive training on the contents of Texas A&M University-Kingsville’s Respiratory Protection Program and his or her responsibilities under it. Employees will be trained on the proper selection and use, as well as the limitations of the respirator. Training also covers how to ensure a proper fit before use and how to determine when a respirator is no longer providing the protection intended.

The EHS Office will provide respirator training consisting of the following:

- Nature and degree of respiratory hazard
- Respirator selection, based on the hazard and respirator capabilities and limitations
- Donning procedures and fit tests including hand's-on practice
- Care of the respirator, i.e., need for cleaning, maintenance, storage, and/or replacement
- Use and limitations of respirator

Respirator training is required initially and annually thereafter and only upon successful completion of the medical evaluation.

Respirator training will be properly documented (Appendix A) and will include the type and model of respirator for which the individual has been trained and fit-tested.

6.0 RESPIRATOR FIT TESTING

A fit test shall be used to determine the ability of each individual respirator wearer to obtain a satisfactory fit with any air-purifying respirator. A qualitative fit tests will be performed. Personnel must successfully pass the fit test before being issued an air-purifying respirator.

No university employee is permitted to wear a negative-pressure respirator in a work situation until he or she has demonstrated that an acceptable fit can be obtained. Respirator fitting is conducted initially upon assignment to a task requiring use of a respirator. Refitting is conducted annually thereafter upon successful completion of the respirator training.

Fit testing will be conducted by the EHS Office and the test results will be the determining factor in selecting the type, model, and size of negative-pressure respirator for use by each individual respirator wearer.

6.1 Qualitative Fit Testing

Federal regulations (29 CFR 1910.1001) require qualitative fit tests of respirators and describe step-by-step procedures. This test checks the subject's response to a chemical introduced outside the respirator face-piece. This response is either voluntary or involuntary depending on the chemical used. Several methods may be used. The EHS Office will utilize the irritant smoke method while conducting the Qualitative Fit Test.

- **Irritant Smoke Test**

The irritant smoke test is an involuntary response test. Air purifying respirators must be equipped with a high efficiency particulate air (HEPA) filter for this test. An irritant smoke, usually either stannic chloride or titanium tetrachloride, is directed from a smoke tube toward the respirator. If the test subject does not respond to the irritant smoke, a satisfactory fit is assumed to be achieved. Any response to the smoke indicates an unsatisfactory fit.

The irritant smoke is an irritant to the eyes, skin, and mucous membranes. It should not be introduced directly onto the skin. The test subject must keep his or her eyes closed during the testing if a full face-piece mask is not used.

6.2 Fit Checking

Each time a respirator is donned (worn), the user must perform positive and negative pressure fit checks. These checks are not a substitute for fit testing. Respirator users must be properly trained in the performance of these checks and understand their limitations.

- **Negative Pressure Check Applicability and Limitations:**

This test cannot be carried out on all respirators; however, it can be used on

face-pieces of air purifying respirators equipped with tight-fitting respirator inlet covers and on atmosphere supplying respirators equipped with breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.

- **Negative Pressure Check Procedure:**

Cover the inlet opening of the respirator's cartridge(s) with the palm of the hand so that it will not allow the passage of air. Inhale gently and hold for at least 10 seconds. If the face-piece collapses inward slightly and no inward leakage of air into the face-piece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and face-piece are not leaking.

- **Positive Pressure Check Applicability and Limitations:**

This test cannot be carried out on all respirators; however, respirators equipped with exhalation valves can be tested.

- **Positive Pressure Check Procedure:**

Close off the exhalation valve with the palm of the hand. Exhale gently. If the face-piece lifts off of the face slightly and no outward leakage of air is detected, it can be assumed that the respirator has been properly fitted.

6.3 Special Problems

There are certain conditions that must be met prior to wearing a respirator. The two most common conditions which interfere with a respirator's performance are as follows:

- **Facial Hair**

No attempt will be made to fit a respirator on an employee who has facial hair which comes between the sealing periphery of the face-piece and the face, or if facial hair interferes with normal functioning of the exhalation valve of the respirator.

- **Glasses and Eye/Face Protective Devices**

Proper fitting of a respiratory protective device face-piece for individuals wearing corrective eyeglasses or goggles, may not be established if temple bars or straps extend through the sealing edge of the face-piece. If eyeglasses, goggles, face shield or welding helmet must be worn with a respirator, they must be worn so as not to adversely affect the seal of the face-piece. If a full-face-piece respirator is used, special prescription glasses inserts are available if needed.

6.4 Respirator User Cards

The EHS Office will issue each respirator user a card stating that the employee has been trained, fitted, and medically evaluated to use respirators. A Respirator User Card will include:

1. Name and identification number of the worker.
2. The statement: " (name) has been trained, fitted and medically evaluated to use the respirator(s) indicated."

3. The type(s), model(s), and size(s) of respirator(s) that the cardholder was issued.
4. Expiration date of card.

10.6.5 Recordkeeping

The EHS and Physical Plant Offices shall maintain employees fit test records. The documentation shall include the type of respirator, brand name and model, method of test and test results, test date and the name of the instructor/tester (See Appendix B).

7.0 ISSUANCE AND MAINTENANCE OF RESPIRATORS

7.1 Issuance of Respirators

The EHS Office will assist departments in the selection of respirators and cartridges. Each respirator user will be issued his or her own respirator. Respirators are not to be shared between employees.

Respiratory protective equipment shall not be ordered, purchased, or issued to personnel unless the respirator wearer has received a medical evaluation, respirator training and a fit test. New employees who require respiratory protective equipment, must be placed into the respirator program before being issued equipment.

7.2 Maintenance

Even though most respirators are basically maintenance-free, there are requirements that each user must complete before and after wearing a respirator.

The maintenance of respiratory protective devices involves a thorough visual inspection for cleanliness and defects (i.e., cracking rubber, deterioration of straps, defective exhalation and inhalation valves, broken or cracked lenses, etc.). Worn or deteriorated parts must be replaced prior to using. No attempt must be made to replace components, make adjustments or make repairs on any respirator beyond those recommended by the manufacturer. Under no circumstances will parts be substituted as such substitutions will invalidate the approval of the respirator.

7.3 Cleaning of Respirators

Employees shall clean and sanitize their respirator after each use. Cleaning and disinfecting of respirators must be done frequently to ensure that contaminants are removed from the surface of the respirator. The following procedure is recommended for cleaning and disinfecting respirators:

1. Remove and discard all used filters, cartridges, or canisters.
2. Wash face-piece in a mild soap and water solution.
3. Rinse completely in clean, warm water.
4. Air dry in a clean area in such a way as to prevent distortion.
5. Clean other respirator parts as recommended by the manufacturer.
6. Inspect valves, head-straps, and other parts to ensure proper working condition.

7. Reassemble respirator and replace any defective parts.
8. Wipe the respirator with an alcohol pad.
9. Place in a clean, dry plastic bag or other suitable container for storage after each cleaning and disinfecting.

7.4 Storage

After inspection, cleaning, and any necessary minor repairs, store respirators to protect against sunlight, heat, extreme cold, excessive moisture, damaging chemicals or other contaminants.

Respirators shall always be placed in sealable plastic bags when not in use. Respirators may be stored in such places as lockers or tool boxes only if they are first placed in carrying cases or cartons. Respirators shall be packed or stored so that the face-piece and exhalation valves will rest in a normal position and not be crushed.

8.0 PROGRAM SURVEILLANCE

The evaluation of the Respirator Program will include investigating wearer acceptance of respirators, inspecting respirator program operation, and appraising protection provided by the respirator. Evidence of excessive exposure of respirator wearers to respiratory hazards will be followed up by investigation to determine why inadequate respiratory protection was provided. The findings of the respirator program evaluation will be documented, and this documentation will list plans to correct faults in the program and set target dates for the implementation of the plans. These evaluations will be conducted at least annually.

9.0 RECORD KEEPING

The following records shall be developed and maintained for the University's Respiratory Protection Program:

Record	Location
Medical Evaluations	<ul style="list-style-type: none"> • Human Resources Office College Hall Rm 210
Training Records Fit Test Records	<ul style="list-style-type: none"> • Human Resources Office College Hall Rm 210 • EHS Office Support Services Bldg
Respiratory Protection Program Manual	<ul style="list-style-type: none"> • EHS Office Support Services Bldg
Hazard Evaluations (Air sampling results, surveys, respirator selection records)	<ul style="list-style-type: none"> • EHS Office Support Services Bldg
Program Evaluations	<ul style="list-style-type: none"> • EHS Office Support Services Bldg

REFERENCES

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- Colton, Craig, et. al., Respiratory Protection: A Manual and Guideline, 2nd Ed., Akron, OH: American Industrial Hygiene Association, 1991.
- Compressed Gas Association: Commodity Specification for Air. (ANSI/CGA G-7.1), Arlington, VA: Compressed Gas Association, Inc., 1989.
- OSHA Standard, 29 CFR 1910.134, "Respiratory Protection".